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UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH ADMINISTRATION
BUREAU OF AGRICULTURAL AND INDUSTRIAL CHEMISTRY

LIST OF PUBLICATIONS AND PATENTS
of the
Northern Regional Research Laboratory
Peoria, Illinois

January - June 1951

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PUBLICATIONS

[Publications marked (*) are not available for distribution]

THE ACYLATION OF CORN STARCH, AMYLOSE AND AMYLOPECTIN.

Ivan A. Wolff, David W. Olds, and G. E. Hilbert.
Jour. Amer. Chem. Soc. 73(1): 346-349. January 1951.

Satisfactory techniques are described for the preparation of whole cornstarch, amylose, and amylopectin triacetate, tripropionate, tributyrate, tricaproate, tripalmitate, and tribenzoate. Solubilities of the esters in a number of organic solvents were qualitatively determined. The solubility of an ester was shown to be dependent on the method used for pretreating the polysaccharide prior to its esterification. The optical rotations of the triesters of amylose were higher than those of whole starch and amylopectin. Molecular rotations of the various aliphatic acid esters of the polysaccharides were found to be approximately constant.

DETERMINATION OF MOISTURE IN STARCH BY DRYING.

N. N. Hellman.
Communications to the Editor, Cereal Chem. 28(1): 79. January 1951.

Corn, potato, and tapioca starches that were dried at 10^{-6} mm. Hg pressure showed no loss in weight when heated in the range of 25° to 110° C. Variations found with different oven methods of moisture determination, which involve drying in the above temperature range, originate, therefore, not from heat decomposition of starch but from different water vapor pressures effective during the drying.

PROTECTIVE FILMS FOR PILOT-PLANT DEODORIZERS.

R. E. Beal and E. B. Lancaster.
Jour. Amer. Oil Chem. Soc. 28(1): 12-16. January 1951.

This study on the contamination of soybean oil by metals which act as pro-oxidants or flavor deteriorators has resulted in developing methods of forming thin films on metal surfaces, the films substantially preventing metallic contamination of the oil, especially during deodorization. The films do not impair flavor stability.

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[1] Previous lists of Northern Regional Research Laboratory's publications and patents were issued as NM-305, AIC-187, and AIC-187, supplements 1-6.

SOME CYCLIC ACETALS OF D-GLUCOSE AND ITS DERIVATIVES.

R. L. Mellies, C. L. Mehltretter, and C. E. Rist.
Jour. Amer. Chem. Soc. 73(1): 294-296. January 1951.

In a study of cyclic acetals of *D*-glucose and its derivatives, diethylidene-, dipropylidene-, dibutylidene-, and diisobutylidene acetals of *D*-glucose were prepared as sirupy compounds. Some of their physical properties were determined. Monostearylidene-*D*-sorbitol was obtained as an amorphous product. The following crystalline cyclic acetals were synthesized and their structures determined: 4,6-butylidene-α-*D*-glucose, methyl 4,6-butylidene-2,3-dimethyl-β-*D*-glucoside, methyl 4,6-propylidene-α-*D*-glucoside, and methyl 2,3-oxidodipropylidene-4,6-propylidene-α-*D*-glucoside.

THE FLAVOR PROBLEM OF SOYBEAN OIL. VII. EFFECT OF TRACE METALS.

C. D. Evans, A. W. Schwab, H. A. Moser, J. E. Hawley, and E. H. Melvin.
Jour. Amer. Oil Chem. Soc. 28(2): 68-73. February 1951.

The development of an improved spectrographic method for the analysis of metal content in oils has made possible the study of metal content in relation to stability. Investigation of various vegetable oils reveals a correlation does exist. These results further emphasize the importance of metals in relation to the stability of soybean oil.

SYNTHESIS AND PROOF OF STRUCTURE OF 5-ACETYLVANILLIN.

Herbert E. Smith, Charles R. Russell, and L. E. Schniepp.
Jour. Amer. Chem. Soc. 73(2): 793-795. February 1951.

A five-step synthesis and the proof of structure of 5-acetylvanillin (2-hydroxy-3-methoxy-5-formylacetophenone), the postulated monomer in the formation of a lignin-like polymer previously reported by Alfred Russell, are described.

CAN YOU USE YOUR OWN DISCOVERIES?

W. L. Cheesman.
Chem. and Engin. News 29(8): 642-643. February 19, 1951.

The acceptance of patent applications for "interference-only" is suggested as an adjunct to current Patent Office practice. If the circumstances approximated those of normal interference development, the number of regular patent applications filed would be decreased and costly and laborious prosecution minimized. At the same time, an inventor could challenge priority of his ideas. Greater freedom would be gained in the non-exclusive use of many new ideas. This would tend to strengthen the existing patent system by eliminating "negative patents." Other advantages are cited which would outweigh probable objections.

THE FLAVOR PROBLEM OF SOYBEAN OIL. VIII. LINOLENIC ACID.

H. J. Dutton, Catherine R. Lancaster, C. D. Evans, and J. C. Cowan.
Jour. Amer. Oil Chem. Soc. 28(3): 115-118. March 1951.

Direct evidence that linolenic acid is responsible for the "fishy, painty, beany, grassy" reversion flavors of soybean oil has been obtained from experiments involving the introduction of linolenic acid radicals into flavor-stable cottonseed oil.

THE FLAVOR PROBLEM OF SOYBEAN OIL. IX. ORGANOLEPTIC IDENTIFICATION AND PROBABILITY ANALYSIS.

C. D. Evans, E. B. Lancaster, H. J. Dutton, and Helen A. Moser.
Jour. Amer. Oil Chem. Soc. 28(3): 118-121. March 1951.

Knowledge of the probabilities for correct change selection by taste panel judges is frequently required in the organoleptic identification of oils and other foods. probability tables have been developed, corresponding to the design of the experiment, for use by taste panels of 20 members or less. Summary tables are presented giving the number of correct identifications required in order that the results shall be statistically significant. Examples are presented showing the application of the probability relationships to the organoleptic identification of edible oils.

IMPROVED TECHNIQUES IN PAPER CHROMATOGRAPHY OF CARBOHYDRATES.

Allene Jeanes, C. S. Wise, and R. J. Dimler.
Analyt. Chem. 23(3): 415-420. March 1951.

The interrelationships, in paper chromatography, of the degree of resolution of reducing sugars, their R_F values, and solvent composition were determined. A multiple development technique was worked out to improve the resolution of sugar mixtures. Included in the studies were six common monosaccharides, six reducing disaccharides, and a mixture of glucose, maltose, and oligosaccharides obtained by the action of α-amylase on amylose. The oligosaccharides constituted, presumably, the homologous series up to a degree of polymerization of at least 10 glucose units. Generalizations are made relative to the choice of solvent combinations and number of developments for optimum separation of sugars.

BOXBOARD FROM WHEAT STRAW TO REPLACE WOOD VENEER IN WIRE-BOUND SHIPPING CONTAINERS.

E. C. Lathrop, T. R. Naffziger, and E. R. Stivers.
TAPPI 34(4): 145-152. April 1951.

A wheat straw boxboard has been developed whose performance in standard wire-bound shipping containers is equal to that of wood veneer, which is meeting with increasing demands for other purposes at higher prices. Specifications for the new board and for the boxes made from it are presented. The process for manufacturing the board is described in some detail. Estimates for the capital cost of a plant to produce 123.5 tons of board per day are presented, together with approximate production costs. The estimated cost of board production is $54.40 per ton. In competition with wood veneer at $110 per thousand board feet f.o.b. southern mills, straw boxboard can be manufactured at a price attractive to the box maker.

CYANOETHYLATION OF α-AMINO ACIDS. II. DICYANOETHYL AND TRICYANOETHYL DERIVATIVES.

L. L. McKinney, E. H. Uhing, E. A. Setzkorn, and J. C. Cowan.
Jour. Amer. Chem. Soc. 73(4): 1641-1644. April 1951.

Aqueous solutions of the alkali salts of alpha amino acids react on heating with acrylonitrile to yield N$\underline{\alpha}$-dicyanoethyl derivatives. The phenolic group of tyrosine reacts very slowly under these conditions. The N$\underline{\alpha}$-dicyanoethyl derivatives exhibit true melting points and are soluble in organic solvents. The second cyanoethyl group is labile to heat, acids and alkalies.

HARD BOARD FROM AGRICULTURAL RESIDUES.

R. V. Williamson and E. C. Lathrop.
Mod. Plastics 28(8): 126, 128, 130, 187. April 1951.

Two processes for producing hard board from rice hulls, peanut shells, or flax shives were explored in a preliminary fashion: (1) By high temperature treatment of the ground residues and vinsol resins and (2) by hot pressing a mixture of ground residue, phenolformaldehyde resin, and pine gum. Acceptable products, the properties of which are described, were obtained by both methods. The board made by the first process is highly resistant to moisture uptake and exhibits unusual stability to atmospheric changes. The amounts of resins required in each case indicate that costs of manufacture would exceed that of boards now made from shavings and like resins.

PREPARATION OF FILMS FROM AMYLOSE.

I. A. Wolff, H. A. Davis, J. E. Cluskey, L. J. Gundrum, and C. E. Rist.
Indus. and Engin. Chem. 43(4): 915-919. April 1951.

Self-supporting films have been prepared from the amylose fraction of starch, and their physical characteristics, chemical resistance, and mechanical properties have been evaluated. The relation of such properties to film thickness, varying amounts of added amylopectin, molecular size of the amylose, heat treatment, and amounts of glycerol added as plasticizer has been investigated. The general mechanical behavior of the film is good; most values of their properties lie within the range of those of common plastic films.

TRIESTERS OF CORN STARCH, AMYLOSE AND AMYLOPECTIN--PROPERTIES.

I. A. Wolff, D. W. Olds, and G. E. Hilbert.
Indus. and Engin. Chem. 43(4): 911-914. April 1951.

The properties of a series of triesters of cornstarch, amylose, and amylopectin were studied. The melting points, solubilities, plastic properties, viscosities, x-ray diffraction patterns, and film characteristics are given. The possible uses of these triesters as protective coatings are discussed in some detail. The amylose esters resemble those of cellulose in many respects and appear suitable for industrial use.

WHAT ABOUT COTTON STALK PULP?

A. J. Ernst, H. M. Sutcliffe, and S. I. Aronovsky.
Paper Indus. 33(1): 46-48. April 1951.

Stalks from three samples of Mississippi cotton were pulped by the kraft and neutral sulfite processes. The neutral sulfite cotton stalk pulps had lower strength properties than those found for wheat straw neutral sulfite pulps. Kraft pulps, prepared from cotton stalks, had strength properties quite similar to those of wheat straw pulps prepared by the same process. Lower yields of pulp were obtained from cotton stalks than from wheat straw by both processes and considerably more cooking chemical was required for the cotton stalks. Even though cotton stalk pulp may be technologically suitable for papermaking, the commercial production of such pulp will depend to a very large extent upon the development of suitable economical methods of collecting these stalks and preserving them in storage.

ANALYSIS OF FAT ACID OXIDATION PRODUCTS BY COUNTERCURRENT DISTRIBUTION METHODS. MODEL COMPOUNDS.

K. T. Zilch and H. J. Dutton.
Analyt. Chem. 23(5): 775-778. May 1951.

Model compounds containing the functional groups found in fat oxidation products were studied as a basis for interpretation of countercurrent distribution data. The behavior of all compounds was nearly ideal and was little influenced by the presence of other dissolved solutes.

HYDROXYSTREPTOMYCIN, A NEW ANTIBIOTIC FROM STREPTOMYCES GRISEOCARNEUS.

F. H. Stodola, O. L. Shotwell, A. M. Borud, R. G. Benedict, and A. C. Riley.
Jour. Amer. Chem. Soc. 73(5): 2290-2293. May 1951.

A new member of the streptomycin series has been degraded to streptidine, N-methyl-L-glucosamine, and 2-hydroxymethyl-3-hydroxy-1,4-pyrone. These cleavage products indicate that the new antibiotic differs from streptomycin only in having a hydroxymethyl group instead of a methyl in the streptose portion of the molecule.

MECHANO-CHEMICAL PROCESS--RATE OF DELIGNIFICATION.

S. I. Aronovsky and G. H. Nelson.
TAPPI 34(5): 216-222. May 1951.

Pulping rate studies were made on wheat straw with soda, kraft, and neutral sulfite pulping chemicals at 73°, 83°, and 93° C., in a small open vessel fitted with a high-speed stirrer. The most rapid pulping rate occurred in the first 5 minutes. Delignification continued after this period but at a greatly retarded rate. About 55% of the lignin, 30% of the pentosans, and 85% of the ash, based on the amounts of these constituents present in the original straw, were removed in the first 5 minutes; at the end of 1 hour, the amounts removed were 70%, 35%, and 90%, respectively. At the same concentration, caustic soda and the kraft chemicals gave practically the same degree of delignification of straw; sodium sulfite was too mild a cooking agent to produce satisfactory pulp at the low temperatures used. Both the higher cooking temperatures and the higher concentrations of cooking chemical increased the rate of pulping, the change in concentration of chemical having the greater effect. Mechano-chemical pulping of commercial straw in a 3 ft. Hydrapulper gave results in good agreement with those obtained with the small laboratory vessel. It is believed that the speed and efficiency of delignification in mechano-chemical pulping is due largely to the increase, by mechanical action, in the diffusion velocities of the active chemicals and reaction products into and out of the fibrous plant material.

REACTIONS OF TERTIARY BUTYL HYPOCHLORITE WITH VEGETABLE OILS AND THEIR DERIVATIVES. IV. CONVERSION OF ALKYL OLEATES AND METHYL LINOLEATE TO DERIVATIVES OF KETOSTEARIC ACIDS.

H. M. Teeter, L. E. Gast, D. Raleigh, and L. C. Woods.
Jour. Amer. Chem. Soc. 73(5): 2302-2303. May 1951.

This is a report of further research to develop new fat derivatives of commercial interest from vegetable oils of the North Central States by reaction with organic hypochlorites. Alkyl alkoxychlorostearates were prepared by the reaction of an alkyl oleate with *tert.*-butyl hypochlorite and an alcohol. Pyrolysis of these compounds yields a mixture of alkyl 9- and 10-ketostearates. Methyl diketo-stearate was obtained from methyl linoleate by the same procedure.

SIEVE ANALYSIS OF GROUND SOYBEANS AND SOY FLOUR.

Irma J. Bolam and F. R. Earle.
Jour. Amer. Oil Chem. Soc. 28(5): 194-195. May 1951.

A new wet method has been devised for the sieve analysis of finely ground soybeans and soy flour. A spray of carbon tetrachloride directed against the underside of the sieve keeps the openings clear, permitting the return flow of the solvent to carry the fines through the sieve. Replicate analyses of samples which contained 12 to 66 percent of material retained by a 325-mesh sieve usually did not differ from the average by more than 1 percent.

TAXONOMY OF YEASTS.

Lynferd J. Wickerham.
U. S. Dept. Agr. Tech. Bul. 1029. 56 pp. May 1951.

This is a report of a study of the classification of yeasts based primarily on their physiological characteristics, and reveals previously unrecognized relationships between different groups heretofore classified largely on the basis of morphological characteristics. Methods of isolation are discussed with special attention to the cultivation of yeasts from substrates having unusually high sugar or salt content. The synthetic media used in the morphological and physiological studies, as well as methods involved, are given in detail. Also described is the application of an improved classification method to the genus *Hansenula* and species assigned to it in the light of recent physiological studies. The probable phylogeny of species of *Hansenula* is emphasized.

AGRICULTURAL RESIDUE PULPS--CROTALARIA PULPS.

A. J. Ernst, H. M. Sutcliffe, and S. I. Aronovsky.
TAPPI 34(6): 247-251. June 1951.

Crotalaria is one of the more important leguminous crops grown on the sandy soils of southeastern United States for erosion control. The two most common varieties, *Crotalaria mucronata* and *Crotalaria spectabilis*, produce high yields of seed and up to 10 tons of green or 2 tons of dry forage per acre. A number of pulping trials were made on these stalks, using the neutral sulfite and kraft processes. Crotalaria required more cooking chemicals and generally longer cooking periods than are necessary to pulp wheat straw. Lower yields of pulp were obtained from Crotalaria than from wheat straw but the Crotalaria pulps were stronger, particularly in tear resistance and folding endurance. In general, the kraft process produced stronger pulp than the neutral sulfite process but the kraft pulp yields were lower. These preliminary experiments indicate that, from a technological standpoint, Crotalaria has good possibilities as a raw material for pulp and paper manufacture. Economic considerations, however, will undoubtedly be the controlling factors in the possible utilization of Crotalaria for pulp and paper production.

ANALYSIS OF FAT ACID OXIDATION PRODUCTS BY COUNTERCURRENT DISTRIBUTION METHODS. II. METHYL OLEATE.

J. Fugger, K. T. Zilch, J. A. Cannon, and H. J. Dutton.
Jour. Amer. Chem. Soc. 73(6): 2861-2864. June 1951.

Countercurrent distribution of methyl oleate, oxidized to .482 and .854 moles oxygen per mole ester at 37° C. with catalysis by ultraviolet light, demonstrated the presence of unoxidized methyl oleate, methyl monohydroperoxido oleate, acidic scission products and other oxidized materials. Formation of the hydroperoxide appears to be followed by attack at the double bond. No evidence of dimerization was found.

INCREASED PROFITS FROM CANE SUGAR BYPRODUCTS.

E. C. Lathrop, S. I. Aronovsky, and T. R. Naffziger.
Sugar Jour. 14(1): 10, 12, 14, 25-33. June 1951.

Increased income to the sugar industry appears possible through the application of a practical process for separating pith from bagasse fiber. The pith-free dry baled fiber would be sold to paper mills; all of the blackstrap molasses produced could be absorbed on the dry pith and sold as feed. It is shown that, although whole bagasse is suitable for corrugating board manufacture, only freshly separated dried pith-free fiber is a high-grade raw material for the manufacture of fine paper. The probable value of pith as a feed is discussed. Cost estimates indicate that, based on $1.50 per bushel corn, pith as feed for cattle is worth about $29 per ton; dried pith-free baled bagasse fiber would be worth about $13.50 per ton f.o.b. sugar mill. Operating costs are still to be determined from large-scale pilot-plant studies on separation of pith and fiber at a sugar mill. In addition, feed and fiber must be prepared and tested commercially.

1,6-DIOXASPIRO (4.4) NONANES FROM γ-(2-FURYL)-ALKANOLS.

Kliem Alexander, L. S. Hafner, and L. E. Schniepp.
Jour. Amer. Chem. Soc. 73(6): 2725-2726. June 1951.

1,6-Dioxaspiro-(4.4)-nonane and 2-methyl-1,6-dioxaspiro-(4.4)-nonane were prepared in significant yield from 1-(2-furyl)-propanol-3 and 1-(2-furyl)-butanol-3 respectively. A mechanism for the formation of 1,6-dioxaspiro-(4.4)-nonanes from γ-(2-furyl)-alkanols is proposed.

A PRACTICAL SYNTHESIS OF D-GLUCURONIC ACID THROUGH THE CATALYTIC OXIDATION OF 1,2-ISOPROPYLIDENE-D-GLUCOSE.

C. L. Mehltretter, B. H. Alexander, R. L. Mellies, and C. E. Rist.
Jour. Amer. Chem. Soc. 73(6): 2424-2427. June 1951.

A practical synthesis of *D*-glucuronic acid has been developed in which 1,2-isopropylidene-*D*-glucose is catalytically oxidized to 1,2-isopropylidene-*D*-glucuronic acid in a yield of 50-60 percent of theory using platinum-carbon catalyst and air. By simple hydrolysis 1,2-isopropylidene-*D*-glucuronic acid is nearly quantitatively converted to *D*-glucuronic acid. A key step in the synthesis is the separation of 1,2-isopropylidene-*D*-glucuronic acid from contaminating byproducts in the oxidation mixture as the insoluble calcium salt. The barium and sodium salts of 1,2-isopropylidene-*D*-glucuronic acid also have been prepared. To facilitate this synthesis an improved procedure has been devised for the preparation of 1,2-isopropylidene-*D*-glucose in aqueous solution in 93 percent yield. A small quantity of byproduct isolated was shown to be isopropylidene-*bis*-(diisopropylidene-*D*-glucose). Its structure, however, has not yet been completely established.

TOBACCOSEED OIL IN SURFACE COATINGS. A COMPARISON WITH SOYABEAN AND LINSEED OILS.

M. N. Rao, C. E. McGrew, and A. J. Lewis.
Paint Tech. 16(186): 241-244. June 1951.

Tobaccoseed oil, an important byproduct of the tobaccoseed industry in India, has been evaluated comparatively with soyabean and linseed oils for utilization in surface coatings. Tables are presented to show the characteristics, composition, drying qualities (both as oil and as paint films), and heat bodying rates (at different temperatures) of each oil.

ISOLATION, CULTIVATION, AND CONSERVATION OF SIMPLE SLIME MOLDS.

Kenneth B. Raper.
Quart. Rev. Biol. 26(2): 169-190. June 1951.

Pseudoplasmodium-forming slime molds of the family Dictyosteliaceae constitute unusually favorable material for investigating fundamental biological phenomena, including intercellular organization, morphogenesis, and cellular differentiation. Suitable techniques for isolating these microorganisms in substantial numbers from soil, leaf mould, and other natural habitats are presented. Close interrelationship is demonstrated between the slime moulds, the host bacteria upon which they feed, laboratory substrata, and the physical environment. Cultures of these slime molds, together with suitable host bacteria, have been successfully maintained in lyophilized form for more than 8 years without appreciable loss in viability.

REPUBLICATIONS

CONDUCTING A TASTE PANEL TO EVALUATE EDIBLE OILS.

Helen A. Moser, H. J. Dutton, C. D. Evans, and J. C. Cowan.
The Soybean Digest 11(3): 16-19. January 1951.

[Previously published in Food Tech. 4(3): 105-109. March 1950, as "Conducting a Taste Panel for the Evaluation of Edible Oils."]

PATENTS

These patents are assigned to the Secretary of Agriculture. Copies of patents may be purchased from the U. S. Patent Office, Washington, D. C.

BETA-CYANOETHYL DERIVATIVES OF AMINO ACIDS AND PROCESS FOR PREPARING THEM.

Leonard L. McKinney, John C. Cowan, and Eugene H. Uhing.
U. S. Patent 2,538,024. January 16, 1951.

A salt of alpha-amino acid is reacted in aqueous solution with either one of two molecular equivalents of acrylonitrile. The reaction mixture is acidified after the reaction is completed. The products, being beta-cyanoethyl substituted amino acids, may be separated from the reaction mixture.

PHENOLIC MOLDING RESINS.

Thomas F. Clark.
U. S. Patent 2,545,446. March 20, 1951.

Saccharification lignin is mixed with cresylic acid, and the mixture heated with phenol and formaldehyde to give a molten thermosetting plastic molding material. The material is washed and comminuted, mixed with finely divided agricultural residue powder and a small amount of hexamethylenetetramine, and the mixture compounded by milling and heat. The products possess a high flexural strength and low water absorption.

SEPARATION AND FRACTIONATION OF SUGARS.

Edna M. Montgomery and Francis B. Weakley.
U. S. Patent 2,549,840. April 24, 1951.

A purified solution of glucose is obtained from an aqueous solution of glucose and polysaccharides by adsorbing the polysaccharides upon activated carbon. The polysaccharides are recovered from the carbon by treatment with aqueous phenol, acetic acid, or ephedrine.

COATING COMPOSITIONS.

Lee Bert Falkenburg, Arthur J. Lewis and John C. Cowan.
U. S. Patent 2,550,682. May 1, 1951.

A basic polyamide having an amine equivalent of 1500 to 2000, formed by reacting polymeric fat acids or esters thereof with an excess of ethylene diamine, is dissolved in alcohol, giving a highly durable film-forming composition for application to metals.

COATING COMPOSITIONS FROM SOYBEAN OILS.

Arthur J. Lewis, Helen A. Moser and John C. Cowan.
U. S. Patent 2,550,703. May 1, 1951.

A minor amount of calcium oxide is added to soybean oil paints containing pigments, such as basic carbonate of white lead, cryptone, or titanox B-30, to reduce the residual tack, and also improve color retention and durability.

ENZYME PRODUCTION.

Julian Corman.
U. S. Patent 2,557,078. June 19, 1951.

A fungal enzyme preparation which may be used to convert starch to high-quality sugar products is prepared by culturing an enzyme-producing fungus in a sterile synthetic medium containing a protein-free source of nitrogen. The absence of protein material in the medium leads to improved taste when these enzymes are used to convert starch to syrups.

HALOGENATED UNSATURATED HIGHER FATTY ACIDS AND DERIVATIVES.

Howard M. Teeter and John C. Cowan.
U. S. Patent 2,557,159. June 19, 1951.

Substantial halogenation of unsaturated higher fatty acids and their derivatives is accomplished by reaction with alkyl hypohalites. The resulting products contain conjugated olefinic linkages. For example, alkali-refined soybean oil is treated with tertiary butyl hypochlorite to produce a product containing 9.92 percent chlorine and a total conjugation of 20.7 percent.

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U.S. DEPARTMENT OF COMMERCE